

DBMS PROJECT

ONLINE BANKING SYSTEM



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Problem Statement

- ❖ To design a database and an application (part of the final evaluation) for an online banking system (like HDFC).

Project Scope

ADMIN FEATURES (Employee or Branch Manager)

- ❖ An employee is able to open new and verify different types of accounts of the users.
- ❖ An employee is able to add/remove money to accounts as a teller.
- ❖ An employee can start/end FD/RD for a user as per request.
- ❖ An employee can start and approve the loan applications of the user.
- ❖ An employee can apply/block a credit or debit card at the user's request.
- ❖ An employee can transfer money from one account to another on request.
- ❖ An employee can see transaction logs to check the status of a transaction.
- ❖ An employee can authorize an advertisement for the bank.
- ❖ An employee can verify the documents submitted by the customers for accounting purposes.
- ❖ An employee can issue a passbook at the user's request.

USER FEATURES (Individual/Joint/Business)

- ❖ A customer can apply for a new account by providing personal information.
- ❖ A customer can view the balance of his/her account.
- ❖ A customer can start/end an FD/RD from the portal whose money will be debited from the account.
- ❖ A customer can apply for personal/collateral loan from the portal.
- ❖ A customer can apply/block for a new credit card/ debit card from the portal.
- ❖ A customer can make bill payments and transfer money from one account to another (NEFT/RTGS/IMPS).
- ❖ A customer can apply for various types of insurance.
- ❖ A customer can make a passbook/checkbook request to a branch for his/her account.

Assumptions

- ❖ Our online banking system is a closed system where no transactions will happen with any other bank or with any other third party outside the scope of it.
- ❖ Investment-related accounts, plans, etc. things will be considered to be handled by some other banking service providers.
- ❖ Any document/photo in the database will be either stored in form of a file with a character string of some size in the respective field or by providing a link to it placed on the cloud.
- ❖ Any other banking-related services that are not listed on the ER diagram are considered to be managed by some other service providers, therefore, outside the scope of this project.

Stakeholders

Businesses, employees, customers, financial markets, and government.

Entities

Branch (IFSC_Code, Branch_Name, Street, City_Village_Town, District, State, Pincode, Opening_Date)

Bank_Account (Account_Number, Date_Of_Opening, Min_Balance_Required, Account_Balance, Interest_Rate, Withdrawal_Limit)

Department (Department_ID, Department_Name)

Employee (Employee_ID, PAN_Number, Aadhaar_Number, First_Name, Last_Name, Apartment, Street, City_Village_Town, District, State, Pincode, DOB, Age(*Derived Attribute*), Employee_Phone_Number, Photo)

Customer (CIN, PAN_Number, First_Name, Last_Name, Building, Street, City_Village_Town, District, State, {Phone_Number}, Pincode)

Collateral (Collateral_ID, Collateral_Name, Collateral_Value, {Documents_Link})

Card (Card_Number, Linked_Mobile_Number, Card_Pin, Issued_Date, Expiry_Date, CVV, Daily_Limit, Monthly_Limit)

Loan (Loan_ID, Loan_Amount, Interest_Rate, Tenure_Months, Loan_Issued_Date, Loan_End_Date(*Derived Attribute*), Loan_Given_To(*FK references Customer(CIN)*), EMI_Amount)

Insurance (Policy_ID, Policy_Start_Date, Policy_Duration_Years, Policy_Expiry_Date(*Derived Attribute*), Premium_Amount, Sum_Insured, Unclaimed_Amount)

Asset_Insurance (Policy_ID(*FK references Insurance(Policy_ID)*), Asset_Document, Asset_Value)

Passbook (Barcode, Date_Issued, Date_Last_Printed)

UPI (UPI_ID, Active_Status, Last_Used, Transaction_Limit_Remaining)

UPI_Transactions (UPI_Transaction_ID, From_UPI_ID(*FK references UPI(UPI_ID)*), To_UPI_ID(*FK references UPI(UPI_ID)*), Transaction_Date_Time, Transaction_Status, Transaction_Amount)

Bill_Payment (Bill_ID)

Auto_Payment (Auto_Payment_ID, Payment_Date, Payment_Frequency)

Auto_Payment_Loan (Auto_Payment_ID(*references Auto_Payment(Auto_Payment_ID)*))

Auto_Bill_Payment (Auto_Payment_ID(*references Auto_Payment(Auto_Payment_ID)*))

Transaction_Log (Log_ID, Log_Date_Time, Log_File)

Ad_Channel (Channel_ID, Chanel_Name, Channel_Link)

Advertisement (Advertisement_ID, Total_Cost, Ad_Type)

User_Credentials (User_Login_ID, User_Login_Password)

Employee_Credentials (Employee_Login_ID, Employee_Login_Password)

Deposit (Account_Number(*FK references Bank_Account(Account_Number)*), Start_Date, Duration, Maturity_Date(*Derived Attribute*), CIN(*FK references Personal_Customer(CIN)*), Interest_Rate)

Chequebook (Account_Number(*FK references Bank_Account(Account_Number)*), MICR_Code, Starting_Cheque_Number, Pages, Date_Issued)

Bank_Statement (Account_Number(*FK references Bank_Account(Account_Number)*), Info_From_Date, Info_Till_Date, Date_Issued)

OTPs (Account_Number(*FK references Bank_Account(Account_Number)*), CIN(*FK references Customer(CIN)*), Valid_From, Valid_Till, OTP)

Installment (Installment_ID, Transaction_Date_Time, Transaction_Status, Transaction_Amount, Transaction_Type)

Relationships with Attributes

Branch_Account (IFSC_Code(FK references Branch(IFSC_Code)), Branch_Account_Number(FK references Bank_Account(Account_Number)))

Account_In_Branch (Branch_Account_Number(FK references Bank_Account(Account_Number)), IFSC_Code(FK references Branch(IFSC_Code)))

Employee_Account (Employee_Account_Number(FK references Bank_Account(Account_Number)), Employee_ID(references Employee(Employee_ID)))

Employee_In_Department (Employee_ID(references Employee(Employee_ID)), Department(FK references Department(Department_ID)))

Employee_Works_Branch (Employee_ID(references Employee(Employee_ID)), IFSC_Code(FK references Branch(IFSC_Code)))

Branch_Managed_By (IFSC_Code(FK references Branch(IFSC_Code)), Employee_ID(FK references Employee(Employee_ID)), Manages_From, Manages_Till)

Collateral_Owned_By (Collateral_ID(FK references Collateral(Collateral_ID)), Collateral_Owner(FK references Customer(CIN)))

Personal_Customer (CIN(FK references Customer(CIN)), Aadhaar_Number, DOB, Age(Derived Attribute), Photo)

Business_Customer (CIN(FK references Customer(CIN)), GST, Business_Name, Business_Logo)

Savings_Account (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references Personal_Customer(CIN)))

Current_Account (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references Business_Customer(CIN)), Maintenance_Charges)

Minor_Account (Account_Number(FK references Bank_Account(Account_Number)), Minor_First_Name, Minor_Last_Name, Parent_Account_Number(FK references Savings_Account(Account_Number)), Parent_CIN(FK references Personal_Customer(CIN)))

Zero_Balance_Account (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references Personal_Customer(CIN)))

Debit_Card (Card_Number(FK references Card(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)))

Prepaid_Card (Card_Number(FK references Card(Card_Number)), CIN(FK references Personal_Customer(CIN)), Prepaid_Balance)

ATM_Card (Card_Number(FK references Card(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)), Cash-Withdrawal_Limit)

Credit_Card (Card_Number(FK references Card(Card_Number)), CIN(FK references Customer(CIN)), Billing_Date, Due_Date(Derived Attribute), Credit_Limit, Total_Amount_Due, Rewards_Point, Minimum_Amount_Due(Derived Attribute))

Account_Linked_Credit_Card (Card_Number(FK references CreditCard(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)))

Collateral_Loan (Loan_ID(FK references Loan(Loan_ID)), Collateral_ID(FK references Collateral(Collateral_ID)), Loan_Type)

Non_Collateral_Loan (Loan_ID(FK references Loan(Loan_ID)), Loan_Type, {Documents_PDF})

Loan_Account (Account_Number(FK references Bank_Account(Account_Number)), Loan_ID(FK references Loan(Loan_ID)))

Insurance_Given_To (Policy_ID, Nominee_ID(FK references Customer(CIN)))

Loan_Protection_Insurance (Policy_ID(FK references Insurance(Policy_ID)), Loan_ID(FK references Loan(Loan_ID)))

Term_Life_Insurance (Policy_ID(FK references Insurance(Policy_ID)), Insured_Person(FK references Personal_Customer(CIN)))

Medical_Insurance (Policy_ID(FK references Insurance(Policy_ID)), Insured_Person(FK references Personal_Customer(CIN)))

Transaction_Details (Transaction_ID, From_Account_Number(FK references Bank_Account(Account_Number)), To_Account_Number(FK references Bank_Account(Account_Number)), Transaction_Date_Time, Transaction_Status, Transaction_Amount, Transaction_Type)

Passbook_Account (Barcode(references Passbook(Barcode)), Passbook_Account_Number(FK references Bank_Account(Account_Number)))

UPI_Account (UPI_ID(references UPI(UPI_ID)), Account_Number_Linked(FK references Bank_Account(Account_Number)))

Bill_Payment_Transactions (Bill_ID(references Bill_Payment(Bill_ID)), Transaction_ID(references Transaction_Details(Transaction_ID)))

Card_Transactions (Transaction_ID(references Transaction_Details(Transaction_ID)), From_Card_Number(FK references Card(Card_Number)), To_Card_Number(FK references Card(Card_Number)), Transaction_Date_Time, Transaction_Status, Transaction_Amount)

Auto_Debit_Account (Auto_Payment_ID(references Auto_Payment(Auto_Payment_ID)), Autodebit_Account_Number(FK references Bank_Account(Account_Number)))

Auto_Loan_Account (Auto_Payment_ID(references Auto_Payment_Loan(Auto_Payment_ID)), Linked_Loan_Account(FK references Loan_Account(Account_Number)))

Auto_Bill_To (Auto_Payment_ID(references Auto_Bill_Payment(Auto_Payment_ID)), Bill_ID(references Bill_payment(Bill_ID)))

Transaction_With_Log (Log_ID(references Transaction_Log(Log_ID)), Transaction_ID(references Transaction_Details(Transaction_ID)))

Ad_Channel_By (Advertisement_ID(references Advertisement(Advertisement_ID)), Channel_ID(references Ad_Channel(Channel_ID)), Authorized_By(references Employee(Employee_ID)))

Credentials_Of_User (User_Login_ID(references User_Credentials(User_Login_ID)), User_ID(references Customer(CIN)))

Credentials_Of_Employee (Employee_Login_ID(references Employee_Credentials(Employee_Login_ID)), Employee_ID(references Employee(Employee_ID)))

Fixed_Deposit (Fixed_Amount)

Recurring_Deposit (Monthly_Deposit_Amount)

Installment_Of_Loan (Loan_ID(FK references Loan(Loan_ID)), Installment_ID(FK references Installment(Installment_ID)))

Relational Schemas

Database: Online_Banking_System

Branch (IFSC_Code, Branch_Name, Branch_Account_Number(*FK references Bank_Account(Account_Number)*), Street, City_Village_Town, District, State, Pincode, Opening_Date)

Bank_Account (Account_Number, Date_Of_Opening, Min_Balance_Required, Account_Balance, IFSC_Code(*FK references Branch(IFSC_Code)*), Interest_Rate, Withdrawal_Limit)

Department (Department_ID, Department_Name)

Employee (Employee_ID, PAN_Number, Aadhaar_Number, First_Name, Last_Name, Employee_Account_Number(*FK references Bank_Account(Account_Number)*), Department(*FK references Department(Department_ID)*), Apartment, Street, City_Village_Town, District, State, Pincode, DOB, Age(*Derived Attribute*), Employee_Phone_Number, IFSC_Code(*FK references Branch(IFSC_Code)*), Photo)

Branch_Managed_By (IFSC_Code(*FK references Branch(IFSC_Code)*), Employee_ID(*FK references Employee(Employee_ID)*), Manages_From, Manages_Till)

Customer (CIN, PAN_Number, First_Name, Last_Name, Building, Street, City_Village_Town, District, State, Pincode)

Customer_Phone_Number (CIN(*FK references Customer(CIN)*), Phone_Number)

Collateral (Collateral_ID, Collateral_Name, Collateral_Value, Collateral_Owner(*FK references Customer(CIN)*))

Documents_Link (Document_ID, Collateral_ID(*FK references Collateral(Collateral_ID)*), Document_Link)

Personal_Customer (CIN(*FK references Customer(CIN)*), Aadhaar_Number, DOB, Age(*Derived Attribute*), Photo)

Business_Customer (CIN(*FK references Customer(CIN)*), GST, Business_Name, Business_Logo)

Savings_Account (Account_Number(*FK references Bank_Account(Account_Number)*), CIN(*FK references Personal_Customer(CIN)*))

Current_Account (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references Business_Customer(CIN)), Maintenance_Charges)

Minor_Account (Account_Number(FK references Bank_Account(Account_Number)), Minor_First_Name, Minor_Last_Name, Parent_Account_Number(FK references Savings_Account(Account_Number)), Parent_CIN(FK references Personal_Customer(CIN)))

Zero_Balance_Account (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references Personal_Customer(CIN)))

Card (Card_Number, Linked_Mobile_Number, Card_Pin, Issued_Date, Expiry_Date, CVV, Daily_Limit, Monthly_Limit)

Debit_Card (Card_Number(FK references Card(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)))

Prepaid_Card (Card_Number(FK references Card(Card_Number)), CIN(FK references Personal_Customer(CIN)), Prepaid_Balance)

ATM_Card (Card_Number(FK references Card(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)), Cash-Withdrawal_Limit)

Credit_Card (Card_Number(FK references Card(Card_Number)), CIN(FK references Customer(CIN)), Billing_Date, Due_Date(Derived Attribute), Credit_Limit, Total_Amount_Due, Rewards_Point, Minimum_Amount_Due(Derived Attribute))

Account_Linked_Credit_Card (Card_Number(FK references CreditCard(Card_Number)), Linked_Account(FK references Bank_Account(Account_Number)))

Loan (Loan_ID, Loan_Amount, Interest_Rate, Tenure_Months, Loan_Issued_Date, Loan_End_Date(Derived Attribute), Loan_Given_To(FK references Customer(CIN)), EMI_Amount)

Collateral_Loan (Loan_ID(FK references Loan(Loan_ID)), Collateral_ID(FK references Collateral(Collateral_ID)), Loan_Type)

Non_Collateral_Loan (Loan_ID(FK references Loan(Loan_ID)), Loan_Type)

Documents_PDF (Document_ID, Loan_ID(FK references Non_Collateral_Loan(Loan_ID)), Document_PDF)

Loan_Account (Account_Number(FK references Bank_Account(Account_Number)), Loan_ID(FK references Loan(Loan_ID)))

Insurance (Policy_ID, Policy_Start_Date, Policy_Duration_Years, Policy_Expiry_Date(*Derived Attribute*), Premium_Amount, Sum_Insured, Unclaimed_Amount, Nominee_ID(*FK references Customer(CIN)*))

Asset_Insurance (Policy_ID(*FK references Insurance(Policy_ID)*), Asset_Document, Asset_Value)

Loan_Protection_Insurance (Policy_ID(*FK references Insurance(Policy_ID)*), Loan_ID(*FK references Loan(Loan_ID)*))

Term_Life_Insurance (Policy_ID(*FK references Insurance(Policy_ID)*), Insured_Person(*FK references Personal_Customer(CIN)*))

Medical_Insurance (Policy_ID(*FK references Insurance(Policy_ID)*), Insured_Person(*FK references Personal_Customer(CIN)*))

Transaction_Details (Transaction_ID, From_Account_Number(*FK references Bank_Account(Account_Number)*), To_Account_Number(*FK references Bank_Account(Account_Number)*), Transaction_Date_Time, Transaction_Status, Transaction_Amount, Transaction_Type)

Passbook (Barcode, Passbook_Account_Number(*FK references Bank_Account(Account_Number)*), Date_Issued, Date_Last_Printed)

UPI (UPI_ID, Account_Number_Linked(*FK references Bank_Account(Account_Number)*), Active_Status, Last_Used, Transaction_Limit_Remaining)

UPI_Transactions (UPI_Transaction_ID, From_UPI_ID(*FK references UPI(UPI_ID)*), To_UPI_ID(*FK references UPI(UPI_ID)*), Transaction_Date_Time, Transaction_Status, Transaction_Amount)

Bill_Payment (Bill_ID, Transaction_ID(*references Transaction_Details(Transaction_ID)*))

Card_Transactions (Transaction_ID(*references Transaction_Details(Transaction_ID)*), From_Card_Number(*FK references Card(Card_Number)*), To_Card_Number(*FK references Card(Card_Number)*), Transaction_Date_Time, Transaction_Status, Transaction_Amount)

Auto_Payment (Auto_Payment_ID, Payment_Date, Payment_Frequency, Autodebit_Account_Number(*FK references Bank_Account(Account_Number)*))

Auto_Payment_Loan (Auto_Payment_ID(*references Auto_Payment(Auto_Payment_ID)*), Linked_Loan_Account(*FK references Loan_Account(Account_Number)*))

Auto_Bill_Payment (Auto_Payment_ID(references Auto_Payment(Auto_Payment_ID)),
Bill_ID(references Bill_payment(Bill_ID)))

Transaction_Log (Log_ID, Log_Date_Time, Transaction_ID(references
Transaction_Details(Transaction_ID)), Log_File)

Ad_Channel (Channel_ID, Chanel_Name, Channel_Link)

Advertisement (Advertisement_ID, Total_Cost, Ad_Type, Channel_ID(references
Ad_Channel(Channel_ID)), Authorized_By(references Employee(Employee_ID)))

User_Credentials (User_Login_ID, User_Login_Password, User_ID(references Customer(CIN)))

Closed_Account (Account_Number(FK references Bank_Account(Account_Number)),
Date_of_Closing)

Blocked_Card (Card_Number(FK references Card(Card_Number)), Date_of_Blocking)

Employee_Credentials (Employee_Login_ID, Employee_Login_Password,
Employee_ID(references Employee(Employee_ID)))

Fixed_Deposit (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK
references Personal_Customer(CIN)), Fixed_Amount, Start_Date, Duration, Maturity_Date(Derived
Attribute), Interest_Rate)

Recurring_Deposit (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK
references Personal_Customer(CIN)), Monthly_Deposit_Amount, Start_Date, Duration,
Maturity_Date(Derived Attribute), Interest_Rate)

Chequebook (Account_Number(FK references Bank_Account(Account_Number)),
MICR_Code(Derived Attribute), Starting_Cheque_Number, Pages, Date_Issued)

Bank_Statement (Account_Number(FK references Bank_Account(Account_Number)),
Info_From_Date, Info_Till_Date, Date_Issued)

OTPs (Account_Number(FK references Bank_Account(Account_Number)), CIN(FK references
Customer(CIN)), Valid_From, Valid_Till, OTP)

Installment (Loan_ID(FK references Loan(Loan_ID)), Transaction_Date_Time,
Transaction_Status, Transaction_Amount, Transaction_Type)

Weak Entities

- ❖ **Transaction_Details** (Transaction_ID, From_Account_Number(FK references *Bank_Account*(*Account_Number*)), To_Account_Number(FK references *Bank_Account*(*Account_Number*)), *Transaction_Date_Time*, *Transaction_Status*, *Transaction_Amount*, *Transaction_Type*)
 - Dependent on the **Bank_Account** entity since transactions happen between the accounts.
- ❖ **UPI_Transactions** (UPI_Transaction_ID, From_UPI_ID(FK references *UPI*(*UPI_ID*)), To_UPI_ID(FK references *UPI*(*UPI_ID*)), *Transaction_Date_Time*, *Transaction_Status*, *Transaction_Amount*)
 - Dependent on the **UPI** entity since UPI transactions happen from one UPI id to another.
- ❖ **OTPs** (Account_Number(FK references *Bank_Account*(*Account_Number*)), *CIN*(FK references *Customer*(*CIN*)), Valid_From, Valid_Till, *OTP*)
 - Dependent on the **Bank_Account** entity since OTPs are sent to an authorized customer on a particular account only.
- ❖ **Fixed_Deposit** (Account_Number(FK references *Bank_Account*(*Account_Number*)), *CIN*(FK references *Personal_Customer*(*CIN*)), *Fixed_Amount*, *Start_Date*, *Duration*, *Maturity_Date*(Derived Attribute), *Interest_Rate*)
 - Dependent on the **Bank_Account** entity since deposits are made to an account only.
- ❖ **Recurring_Deposit** (Account_Number(FK references *Bank_Account*(*Account_Number*)), *CIN*(FK references *Personal_Customer*(*CIN*)), *Monthly_Deposit_Amount*, *Start_Date*, *Duration*, *Maturity_Date*(Derived Attribute), *Interest_Rate*)
 - Dependent on the **Bank_Account** entity since deposits are made to an account only.

- ❖ **Chequebook** (Account_Number(FK references Bank_Account(Account_Number)), MICR_Code(*Derived Attribute*), Starting_Cheque_Number, Pages, Date_Issued)
 - Dependent on the **Bank_Account** entity since chequebooks are issued to an account only.
- ❖ **Bank_Statement** (Account_Number(FK references Bank_Account(Account_Number)), Info_From_Date, Info_Till_Date, Date_Issued)
 - Dependent on the **Bank_Account** entity since monthly reports in the form of bank statements are for an account only.
- ❖ **Installment** (Loan_ID(FK references Loan(Loan_ID)), Transaction_Date_Time, Transaction_Status, Transaction_Amount, Transaction_Type)
 - Dependent on the **Loan** entity since installments are made to a particular loan only.

Ternary Relationships

- ❖ **Ad_Channel_By** (Advertisement_ID(references Advertisement(Advertisement_ID)), Channel_ID(references Ad_Channel(Channel_ID)), Authorized_By(references Employee(Employee_ID)))
 - Relationship between **Advertisement**, **Ad_Channel**, and **Employee** since each ad is released on only one channel and authorized by only one employee

SQL Queries

-- Query 1 [select, order by asc/desc]

```
SELECT IFSC_Code, Branch_Name, District, State
FROM Branch
ORDER BY State ASC, Branch_Name DESC;
```

-- Query 2 [insert]

```
INSERT INTO Branch_Managed_By
VALUES (100014, 10026, '2027-11-12', '2030-11-12');
SELECT * FROM Branch_Managed_By;
-- DELETE FROM Branch_managed_By WHERE Employee_Id = 10026;
```

-- Query 3 [update]

```
UPDATE Employee
SET Department = 1
WHERE Employee_ID = 10026;
SELECT * FROM Employee;
```

-- Query 4 [delete]

```
DELETE FROM Customer_Phone_Number
WHERE CIN = 100000400;
-- INSERT INTO Customer_Phone_Number
-- VALUES (100000400, 6679930452);
SELECT * FROM Customer_Phone_Number;
```

-- Query 5 [sum, if_null]

```
SELECT COALESCE(SUM(Collateral_Value), 0)
AS Total_Collateral_Value
FROM Collateral;
```

-- Query 6 [case when then else]

```
SELECT Account_Number,
CASE
    WHEN Account_Balance > 500000 THEN 'The balance is greater than 5 lakhs'
    WHEN Account_Balance > 100000 THEN 'The balance is between 1 to 5 lakhs'
```

```
ELSE 'The balance is under 1 lakh'  
END AS Balance  
FROM Bank_Account;
```

-- Query 7 [exists]

```
SELECT Card_Number, Linked_Mobile_Number  
FROM Card  
WHERE EXISTS (SELECT * FROM Debit_Card WHERE Debit_Card.Card_Number =  
Card.Card_Number);
```

-- Query 8 [like]

```
SELECT * FROM Customer  
WHERE City_Village_Town LIKE '%_pur';
```

-- Query 9 [between, and]

```
SELECT * FROM Transaction_Details  
WHERE Transaction_Status = 'success' AND Transaction_Date_Time BETWEEN  
'2022-01-01 00:00:00' AND '2022-02-01 00:00:00';
```

-- Query 10 [count, group by, having]

```
SELECT COUNT(Account_Number) , Min_Balance_Required  
FROM Bank_Account  
GROUP BY Min_Balance_Required  
Having COUNT(Account_Number)>100;
```

-- Query 11 [join]

```
SELECT Account_Number, Card_Number, Cash-Withdrawal_Limit  
FROM Bank_Account INNER JOIN ATM_Card ON Account_Number = Linked_Account  
WHERE Account_Number = '11000000120';
```

-- Query 12 [alter table]

```
ALTER TABLE Employee  
ADD CONSTRAINT chk_age CHECK (Age>=18);  
-- ALTER TABLE Employee  
-- DROP CONSTRAINT chk_age;  
SELECT * FROM Employee;
```

-- Query 13 [create view]

```
CREATE VIEW JalandharCustomer AS  
SELECT *  
FROM Customer  
WHERE City_Village_Town = 'Jalandhar';  
SELECT * FROM JalandharCustomer;
```

-- Query 14 [authorization]

```
CREATE USER IF NOT EXISTS 'ars'@'localhost'  
IDENTIFIED BY 'ars';
```

```
GRANT INSERT  
ON online_banking_system.advertisement  
TO 'ars'@'localhost';
```

```
SHOW GRANTS FOR 'ars'@'localhost';
```

```
REVOKE INSERT  
ON online_banking_system.advertisement  
FROM 'ars'@'localhost';
```

```
DROP USER IF EXISTS 'ars'@'localhost';
```